NGST PROGRESS MONITORING METRIC
Draft for discussion

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PURPOSE

The purpose of the "Progress Monitoring Metric" is to measure as impartially as possible the progress of the NGST program. At any given time during the project life, the proposed metric will allow establishing how the program is:

- meeting the scientific goals, **GOAL 1 ("What")**
- remaining within the cost and schedule constraints, **GOAL 2 ($ and "When")**
- and is satisfying NASA's current management approach
  (emphasis on technology development and industry involvement) **GOAL 3 ("How")**

APPROACH

- An efficient “progress monitoring metric” is:
  - clearly quantifiable
  - impartial
  - sufficiently general to be insensitive to changing scientific and economic conditions

- A few critical high level goals are to be preferred to numerous sub-goals because this
  - allows for progress assessment at the system level, which is “what really counts”
  - allows for compensation of underachievement in one area with overachievement in others,
  - avoids having the Project accountable for unmet sublevel goals of minor significance

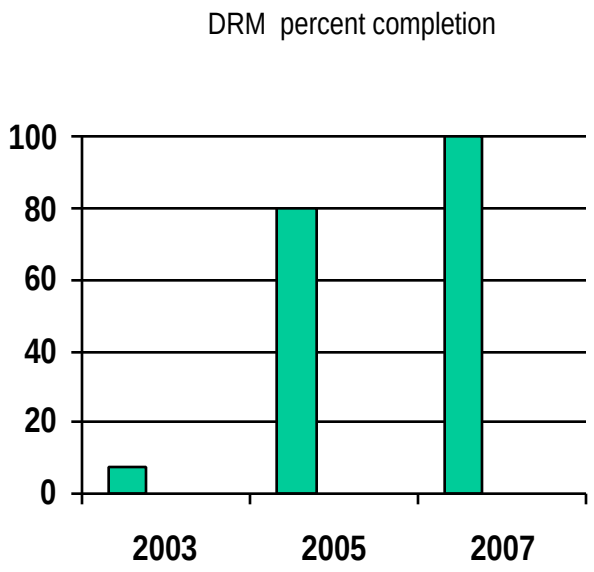
- Thanks to the DRM (Design Reference Mission), we have the means to judge performance at the highest level. The DRM is the ultimate metric since it synthesizes all scientific requirements (e.g... mirror diameter, optical quality, pointing, throughput, detector efficiency, detector noise, instrumental background etc....) in one single figure of merit. This will be the most important metric for Goal 1.

GOAL 1: MEETING SCIENCE GOALS

Metric: Time required to accomplish the core program

Target: Accomplish the DRM in 2.5 years (half of the nominal mission lifetime)

Significance: The DRM represents the current understanding of the type of observations required to accomplish the core of the science program. (Note that with an expected mission lifetime of 10 years, this leaves 7.5 years of observation for General Observers.)



Year of launch	*2003*	*2005*	*2007*
Mirror diameter (m)	3.4	4.5	8
NIR Field of view	0.5'x0.5'	4'x4'	4'x4'
NIR Dark current	0.1 e/s	0.05e/s	0.02 e/s
MIR channel	none	none	incl
Sunshield	fixed	fixed	deployed

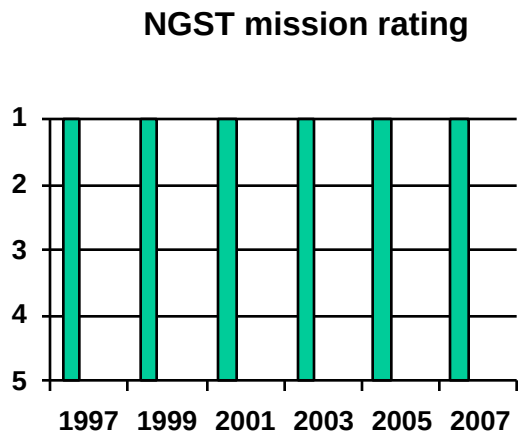
Note: values above are for illustrative purpose only

GOAL 1: MEETING SCIENCE GOALS (Ctd)

Metric: Relevance of the science program

Target: NGST's science program rated #1 priority by NASA's science advisory committee

Significance: Science space missions typically take from 10 to 20 years from inception to launch. It is important to ascertain that the science program does not become obsolete as the project progresses.

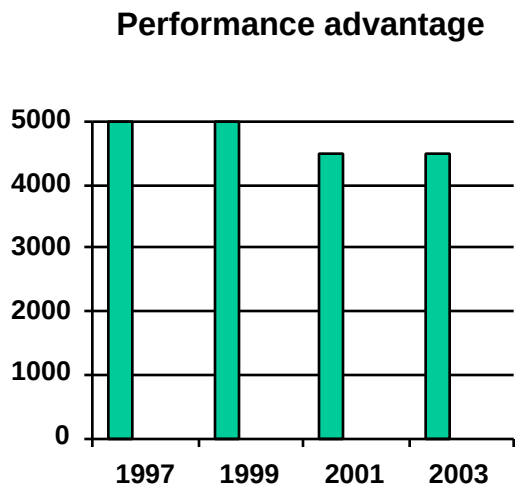


GOAL 1: MEETING SCIENCE GOALS (Ctd)

Metric: Scientific advantage over ground observatories and other space missions

Target: Performance (speed x FOV) >1000 times better than ground and airborne observatories and other space missions in the 1-5 micron range (currently 5000 times better - ref NGST booklet fig 2.6)

Significance: Space missions are expensive. It is important to ascertain that NGST's performance advantage does not become eroded by ground observatory improvements or competing space missions. (If this were the case, the science program and/or NGST's capability should be adjusted accordingly).



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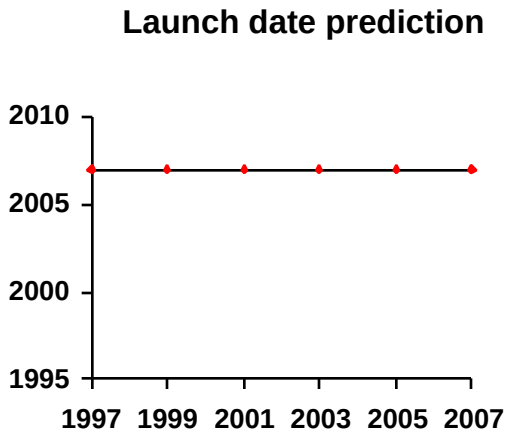
GOAL 2: MEETING COST AND SCHEDULE

Metric: Launch date

Target: 2007

Significance: Delays are costly and can erode the scientific advantage of a mission.

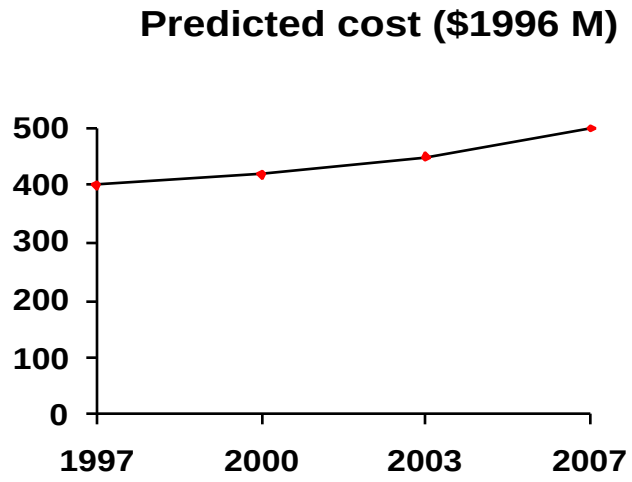


GOAL 2: MEETING COST AND SCHEDULE (Ctd)

Metric: Predicted cost at launch vs. original budget

Target: $500M (1996 $)

Significance: Overruns, aside from breaking NASA's promises to Congress and the taxpayers, consume resources that might have supported other space endeavor.

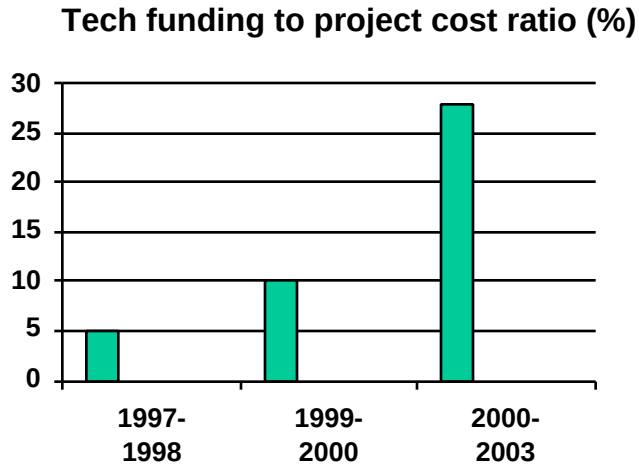


GOAL 3: FULFILLING MANAGEMENT DIRECTIVES

Metric: Associated technological development

Target: Cumulative ratio of technological development funding to direct project funding = 28% at end Phase B.

Significance: As per its charter, NASA is to foster technological progress in the pursuit of space endeavors. Technological advances enable a given mission and may benefit future similar missions.



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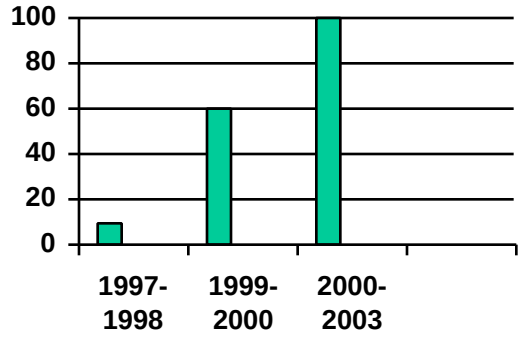
GOAL 3: FULFILLING MANAGEMENT DIRECTIVES (Ctd)

Metric: Percentage of validated critical technologies

Target: 100 % by the end of Phase B

Significance: To ensure that cost and schedule are met, it is important that all critical technologies be fully validated before Phase C/D begins.



Technology	*Validated*
Mirror areal density	
NIR detector FOV	
NIR detector dark current	
MIR detector	
Low noise RW	
Cryocooler	
Large, deployable sunshield	
Cryoactuators	

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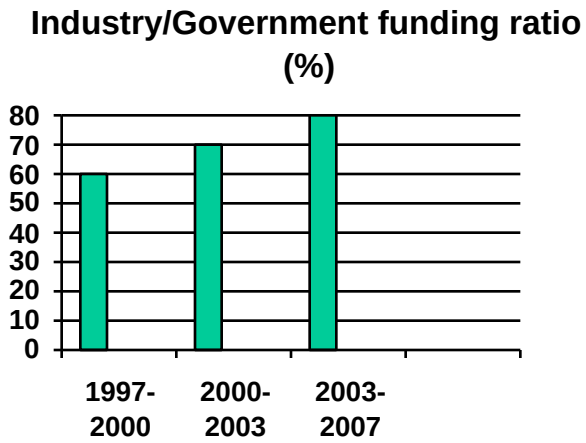
GOAL 3: FULFILLING MANAGEMENT DIRECTIVES (Ctd)

Metric: Industry/Government funding ratio

Target: 80% of funds to industry

Significance: To minimize cost and leverage industry expertise, the majority of the work should be done in industry.



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